ABUTMENT ROTARY PUMP WITH REPELLING MAGNETS

CROSS-REFERENCE TO RELATED APPLICATIONS

This Continuation-In-Part application claims the benefit of U.S. patent application Ser. No. 14/192,248 filed Feb. 27, 2014 now abandoned.

FIELD OF THE INVENTION

The invention is in the field of pumps, and more particularly rotary pumps of the type having an abutment within a stator chamber with inlet and outlet ports.

BACKGROUND OF THE INVENTION AND DESCRIPTION OF RELATED ART

The term "abutment rotary pump" is used herein to refer to a device comprising a movable partition separating the inlet and outlet streams within a stator chamber or housing and a rotor that rotates within the chamber to cause sequential intake, compression, and the exhaust of a fluid medium such as a gas, a liquid, or combination thereof. The term, therefore, comprehends not only devices that cause fluid movement but also devices that compress or pressurize fluids with or without ignition or combustion. Further, the term "abutment rotary pump" embraces a reverse operation in which fluid drives a rotor rather than the rotor driving the fluid, i.e., in reverse operation every pump is effectively a motor. Existing abutment rotary pumps use complex linkages, weights on the abutment, and springs to assure abutment contact with the rotor.

One example of an abutment configuration is shown in U.S. Pat. No. 2,238,395 to Nittka. The pump in the Nittka patent comprises a rotor working in unison with a flap valve requiring numerous components. The device is characterized by the complexity of the many parts required to manipulate a flap valve.

Another example of an abutment configuration is shown in U.S. Pat. No. 715,933 to Allen. The engine and pump in the Allen patent comprises dual abutments working in unison with rotary valves with exhaust stream traveling through a port in the rotor expelled through the driveshaft. The device is complicated and requires several parts working in combination with the abutments.

An alternative abutment configuration is shown U.S. patent application Ser. No. 14/022,486 to applicant. A swinging abutment maintains contact with the rotor to partition the intake and outlet ports. The abutment is actuated primarily from the outlet pressure generated from a rotating rotor.

An example of utilizing magnets to repel in a pumping configuration is shown in U.S. patent application Ser. No. 12/050,498 to Youker and Jaques. Unlike the applicant, the Youker and Jaques "vane" rotary pump configuration uses repelling magnets in a less demanding or ancillary role. The Youker and Jaques invention more importantly requires in addition, various magnetized components and centrifugal force to slidingly engage the multiple vanes to effect pumping. The invention has many parts and is elaborate as compared to the of applicant's use of repelling magnets in an abutment configuration.

It would be advantageous to simplify pump abutments to seal working members within the confines of the stator.

BRIEF SUMMARY OF THE INVENTION

The present invention comprises a pump structure having a stator chamber with a substantially continuous wall with intake and exhaust ports and abutment pocket therein. The pump further comprises a centrically positioned shaft with an eccentrically mounted rotor within the chamber such that as the rotor rotates, the rotor maintains a wiping contact between a segment of the outside diameter of the rotor and the inner wall of the chamber. The abutment affixed in the abutment pocket maintains contact with the outside diameter of the rotor to effect intake, compression, and exhaust functions with each 360° (degrees) of rotor movement. The abutment is pressured by magnets with poles of the same polarity facing each other. Since magnets of the same polarity repel each other, this force is applied to an abutment to provide continuous wiping contact with the outside diameter of the rotor. The intake and exhaust ports are spaced-apart from each other and separated by the partition of the abutment.

In the illustrative embodiment, the chamber inner wall is cylindrical and the rotor is comprised of a cylindrical body with a segment having contact with the chamber inner wall so that each 360° of rotation the rotor body is in contact with the inner wall except momentarily when the rotor is only in direct contact with the abutment. In the illustrative embodiment, the rotor body and driven post are shown as a solid part.

In accordance with a preferred embodiment hereafter described, the intake and exhaust ports are spaced-apart from each other and separated by the partition of an abutment, an abutment that utilizes repelling magnets. As will be understood from the following specification, the pump of the present invention can be scaled to any desired capacity with pump, abutment, rotor and shaft components being constructed using any material or combination of materials including hard dense plastics, ceramics, cermets, and/or non-magnetic metals.

These and other features and advantages of the invention will become apparent from the detailed description below, in light of the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** has a plan view of an abutment rotary pump embodiment of the invention with the rotor in contact with the abutment that separates the intake port and exhaust port and an exploded detail view of the abutment pocket, magnets, and abutment. Also shown is a perspective view of a one piece rotor and driven post.

FIGS. **2A-2D** make up a schematic, sequential showing of the rotor and abutment position over approximately 360° of rotation.

For purposes of clarity and brevity, like elements and components will bear the same designations and numbering.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. **1**, there is shown a rotary pump **10** comprising a stator **12** defining a cylindrical chamber having an inner wall **14** interrupted only by the spaced-apart intake (inlet) and exhaust (outlet) ports **16** and **18** respectively and the abutment pocket **19** that accommodates the abutment **17**. It is understood that a cover plate or other structure (not shown) closes the chamber when all parts described are installed. The chamber is cylindrical as defined by the inner wall **14**, and has a geometric center at **20**. The abutment **17** is located between intake and exhaust ports, **16** and **18**. The abutment **17** is affixed in the abutment pocket **19** which also accommodates magnets **21** positioned with same poles facing each other so that repelling occurs. Note "S" for South and "N" for North lettering on the magnets to illustrate pole position. The repelling magnets exert spring like pressure on